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STATUS OF THE CLAIMS

The present application was filed with Claims 1 through 29. Claims 1 through 29 remain pending in this application.

THE CLAIMS ARE NOT OBVIOUS IN VIEW OF THE POTHAPRAGADA AND TAODA PATENTS

The Examiner rejected Claims 1-10, 12, 13, 15, 21, and 26 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,442,682 issued to Pothapragada, et. al ("682" or "the 682 Patent") in view of U.S. Patent No. 5,857,459 issued to Taoda ("459" or "the 459 Patent"). The Applicant respectfully traverses these rejections.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. M.P.E.P. §2143 (2000).

In the present case, the proposed combination of references does not include each element set out in the present claims. Thus, the April 16, 2003 Office Action does not make out a prima facie case of obviousness with respect to the present claims and the claims are therefore entitled to allowance as they stand.

The 682 Patent

The 682 Patent discloses a method and apparatus for tuning or configuring a file system based on an analysis of file system user data. As shown in Figure 1 of the 682 Patent and described from Col. 4, line 62 to Col. 5, line 31, the file system configuration process includes first analyzing and characterizing the file system user data. The system disclosed in the 682 patent then uses the characterized user data to determine the predominant types of operations performed on the data, and configures the file system to optimize performance for those predominant types of operations. As indicated at Col. 5, lines 29 through 31, the file system is ultimately updated with the determined optimizations and then the system is rebooted.

It is important to note that once the file system is optimized and the system is rebooted, the file system handles all operations the same regardless of the characteristics of the operations. Thus, the 682 Patent does not teach or suggest handling file system requests differently on a request by request basis depending upon the nature of the request.

The 459 Patent

The 459 Patent discloses an optical disk array apparatus including an arrangement for determining whether a file should be stored in a single optical disk or stored across a number of optical disks. The purpose of storing a large file or frequently accessed file across multiple optical disks is that the multiple optical disks can be operated in parallel to read or access the file data, reducing data access time. The 459 Patent does not teach or suggest any arrangement for diverting file access requests around the normal file system processes, but only storing a file on multiple optical drives when faster access to the data is desired.

The 682 and 459 Patents Fail to Teach or Suggest all of the Elements Set Out in the Present Claims

Prior art file systems use a set of file system processes that are interposed between a user and the data storage system that physically stores the data. Data storage systems that use an array of storage devices include array controller processes for performing the actual data transfer operations to and from the storage devices. In a prior art system, all file access operations, that is, operations on a file defined by the file system, are processed through the file system processes. The file system processes then communicate with the array controller processes which are actually responsible for physical access to the data storage devices. This process through the file system processes and then the array controller processes slows data access in some cases, especially for large files. Please see the present application at page 1, line 11 through page 3, line 14 and Figure 1 for a more thorough discussion of the prior art cooperation between a file system and array controller processes.

The present invention is directed to a data processing system that maintains all of the benefits of a file system while skipping the standard file system processes for certain file system access operations. Certain file system access operations in the present invention are defined as divertible operations. When a divertible file system access operation is directed to the present system, the system first detects that the operation is a divertible operation and then diverts the operation from the file system processes to the array controller processes for direct processing through those processes. Because the normal file system processes have been skipped for this file system access operation, the file system does not have the information it needs to maintain the integrity of the file system. Thus, according to the invention, the array controller processes

send operation result information to the file system processes so that the file system data may be updated to maintain file system integrity.

Referring now specifically to the present claims, Claim 1 is directed to a method for accessing a data storage device controlled by array controller processes. The method includes the steps of:

(a) receiving a file system access operation request;

(b) determining if the file system access operation request specifies an operation comprising a divertible operation;

(c) if the file system access operation request specifies a divertible operation, diverting the divertible operation from file system processes associated with the data storage device to the array controller processes;

(d) performing the divertible operation with the array controller processes; and

(e) updating a file system data management arrangement with operation result information from the array controller processes, the file system data management arrangement being controlled by the file system processes.

As mentioned above, the 682 Patent does not teach or suggest any mechanism for diverting file system access operations around the file system processes. Rather, the 682 Patent is simply directed to optimizing the file system operation based on the types of file system operations that will be used. Figures 1 through 6 of the 682 Patent illustrate the processes performed to configure the file system for optimum file system performance. These figures do not illustrate file access operations themselves and certainly do not suggest any diversion of file access operations around the file system processes. In particular, the 682 patent does not suggest making any determination as to whether a received file system access operation is a divertible

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operation as required in element (b) of Claim 1 and also does not suggest diverting an operation from the file system processes to array controller processes as required in element (c) of Claim 1. Furthermore, the 682 Patent certainly does not suggest performing any file system access operation with array controller processes as required in element (d) of Claim 1, or updating the file system data management arrangement with operation result information from the array controller processes as required in element (e) of Claim 1. It is noted that the text at Col. 7, lines 13-30 of the 682 Patent which the Examiner referenced with respect to element (d) of Claim 1, very clearly describes a process of file system configuration and not a process that performs a file system access operation with array controller processes. It is further noted that the "update file system" process box 324 in Figure 1 of the 682 patent, which the Examiner appears to reference with regard to element (e) of Claim 1, is an update of the file system to optimize its operation and not an update of file system data for any file system access operation that has been performed outside the file system.

To summarize the comparison between the invention set out in Claim 1 and the system disclosed in the 682 Patent, the 682 Patent does not teach or suggest the steps set out at elements (b), (c), (d), and (e) of Applicant's Claim 1 as originally submitted in the present application.

The 459 Patent does not make up for any of the deficiencies of the 682 Patent. As discussed above, the 459 Patent is directed to a disk array apparatus having a control arrangement that allows data to be stored on one disk or multiple disks depending upon certain characteristics of the data. Although the 459 Patent does teach looking at the characteristics of a file and then storing it on multiple disks or a single disk depending upon those characteristics, the patent does not teach or suggest diverting a divertible operation from file system processes associated with the data storage device to the array controller processes as required at element (c) of Claim 1.

disagree

The 459 Patent also does not suggest performing the divertible operation with the array controller processes as required at element (d) of Claim 1, and does not suggest updating a file system data management arrangement with operation result information from the array controller processes as required by element (e) of Claim 1.

For all of these reasons, the Applicant respectfully submits that Claim 1 is clearly not obvious in view of the 682 Patent and the 459 Patent and is entitled to allowance together with its dependent claims, Claims 2 through 14. The above arguments with regard to Claim 1 apply with equal force to independent Claim 15 for a program product, and independent Claim 26 for an apparatus. Thus, Claims 15 and 26 together with their respective dependent claims are entitled to allowance over the 682 Patent and the 459 Patent.

It is noted that the Examiner cited several different locations in the 682 Patent in forming the 103 rejections as to the independent Claims. This referenced subject matter in the 682 Patent, for example, Col. 6, lines 12-33, Col. 7, lines 44-64, etc., is all directed to optimizations or configurations of the file system processes themselves. This referenced subject matter does not suggest any component outside the file system for performing file system access operations as required in the present claims.

Independent Claim 21 is directed to a program product for servicing file system access operation requests from a file system client to a file system that includes a file system data management arrangement which contains information on each file in the file system. The program product includes:

(a) operation detection program code for detecting divertible operations in a file system access operation request received from a file system client, and for preventing each divertible operation from being performed by the file system; and

(b) array controller program code for performing each divertible operation, managing a data storage device including data storage media, and communicating with the file system program code to update the file system data management arrangement in response to the performance of a divertible operation.

As discussed above, the 682 Patent does not teach or suggest any program code for diverting a file system access operation from the file system processes, and certainly does not suggest a program for preventing certain classes of file system operations from being performed by the file system processes. The 682 Patent also does not suggest any program code for performing the diverted file system access operation outside of the file system processes and then updating the file system after the operation has been performed through the alternative route. The 459 Patent, again, does not make up for these deficiencies in the 682 Patent. Although the 459 Patent does detect certain types of files to be stored and stores them differently from other files, the 459 Patent does not in any way suggest any code for preventing the file system from performing any file system access operation and does not suggest performing the diverted file system access operation outside of the file system processes and then updating the file system after the operation has been performed through the alternative route.

For these reasons the Applicant submits that Claim 21 is entitled to allowance over the cited references together with its dependent claims, Claims 22 through 25.

THE CLAIMS ARE NOT OBVIOUS OVER THE 682 AND 459 PATENTS, FURTHER IN VIEW OF THE VENKATESH PATENT

The Examiner rejected Claims 11, 14, 17, 23 and 27-29 under 35 U.S.C. § 103(a) as being unpatentable over the 682 and 459 Patents, further in view of U. S. Patent 5,974,503 to Venkatesh et al. ("503" or the "503 Patent"). The Applicant respectively traverses these rejections on the ground that the proposed combination does not include each element required in the respective claim.

The 503 Patent discloses a method and data storage system for maintaining continuous media files such as video files in a RAID system. The disclosure in the 503 is primarily directed to how the continuous media files are allocated across media in the RAID system. The 503 Patent does not teach or suggest any sort of divertible file system access operations that are diverted to array controller processes and prevented from being executed by the file system processes. Moreover, the 503 Patent does not suggest directly executing a file system access request outside of the file system processes and then updating the file system data management to maintain file system integrity.

For all of these reasons, nothing in the 503 Patent makes up for the deficiencies of the 682 Patent and 459 Patent with respect to the independent Claims. Thus, the Applicant submits that all of the present claims are allowable over the 682, 459, and 503 Patents.

The Examiner cited the 503 Patent specifically against the conversion operation required in Claims 11, 17, and 23, noting language at Col. 40, lines 35-45 of the 503 Patent. It is noted that the referenced paragraph at Col. 40 in the 503 Patent does not suggest converting a diverted file system access operation from a byte offset operation to a block access operation. The

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conversion referenced in that paragraph is from a block access to a time position within a file for a video segment.

CONCLUSION

For all of the above reasons, the Applicant respectfully requests reconsideration and allowance of Claims 1 through 29

If the Examiner should feel that any issue remains as to the allowability of these claims, or that a conference might expedite allowance of the claims, she is asked to telephone the undersigned attorney.

Respectfully submitted,

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Date: 16 July 2003

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CERTIFICATE OF FACSIMILE

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office, (Fax No. 703-746-7239) on 16 July 2003

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